JOURNAL OF ELECTRICITY

POWER AND GAS

Devoted to the Conversion, Transmission and Distribution of Energy

Entered as second class matter May 7, 1906, at the Post Office at San Francisco, Cal., under the act of Congress March 3, 1879.

VOL. XXXIV NO. 16 | SAN FRANCISCO, APRIL 17, 1915 | PER COPY, 25 CENTS

CANADIAN HYDROELECTRIC EXHIBIT.

THE JITNEY BUS AT SAN DIEGO.
BY W. CLAYTON.

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INSIDE WIRING METHODS.
BY JOHN CARRELL.

ELECTRIC EQUIPMENT OF THE AEROSCOPE.
BY PAUL C. BUTTE.

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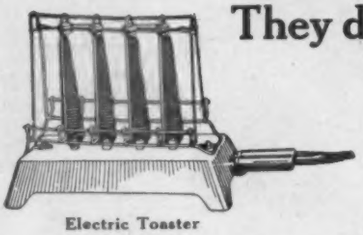
Alphabetical Index to Advertisers, Page 8 | Where to Buy It in the West, Page 9



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JOURNAL OF ELECTRICITY
POWER AND GAS
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VOLUME XXXIV SAN FRANCISCO, APRIL 17, 1915 NUMBER 16

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CANADIAN HYDROELECTRIC EXHIBIT

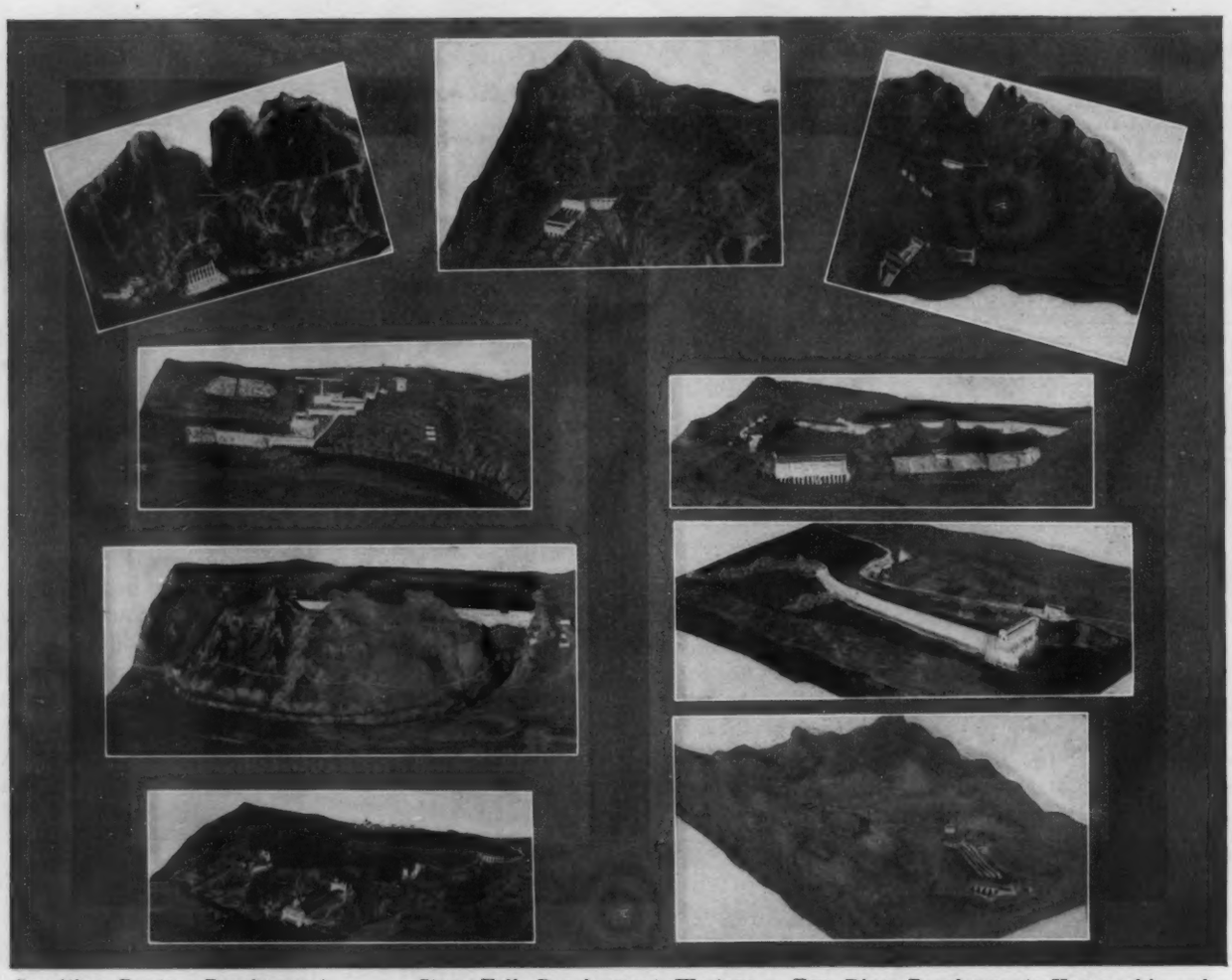
The Canadian exhibit at the Panama-Pacific International Exposition at San Francisco is one of the most notable features of the exposition, not only on account of its originality of design, but also because of its completeness of display. It graphically portrays the carving out of an empire extending from the Atlantic to the Pacific and most certainly creates a desire to visit this wonderful land. All of its natural and artificial resources, its mines, mills, grain fields, railroads, orchards, navigation and water power resources are most attractively portrayed.

The waterpower exhibit is particularly noteworthy, consisting of a model of each of the important hydroelectric developments extending across the continent. Except for Norway, Canada already has the highest ratio of developed waterpower to population of any country in the world. Furthermore as to future possibilities it has the lowest ratio of hydroelectric power in proportion to area. Of the estimated 17,500,000 available h.p., about one million horsepower developed, giving about .75 h.p. per capita.

This remarkable development has been possible largely by the adequate laws which encourage development with due regard to present and future public interest. The policy of the waterpower branch of the Canadian Department of the Interior with regard to the conservation and development of the waterpowers under its jurisdiction in Manitoba, Saskatchewan, Alberta, British Columbia and the Northwest territory has brought about actual development without delay, adequate control of consumers' rates and a fair rental. This department of the Dominion Government has charge of the exhibit at the exposition in charge of J. B. Challies, superintendent.

Canadian Building at Panama-Pacific International Exposition.

The exhibit is installed at the left of the main entrance to the Canadian building. It consists essentially of a great map of Canada with models of eleven hydroelectric power plants arranged in the foreground. These models are carefully worked out in detail as regards the power installation and topography. In addition the walls of the room are adorned with photographs of water falls and power plants and a



Coquitlam-Buntzen Development, Vancouver Power Co.

Stave Falls Development, Western Canada Power Co.

Bow River Developments, Kananaskis and Horseshoe Falls, Calgary Power Co.

Iroquois Falls Development, Abitibi Power & Paper Co.

Point Du Bois Development, City of Winnipeg.

Eugenia Falls Development, Ontario Hydroelectric Commission.

Cedar Rapids Development, Cedar Rapids Power & Mfg. Co.

Shawinigan Falls Development, Shawinigan Water & Power Co.

Kakabeka Falls Development, Kaministiquia Power Co.

General View of Canadian Water Power Exhibit.

large supply of descriptive literature is available for distribution to interested engineers. Commencing at the western line the following installations are shown:

Coquitlam-Buntzen plant of Vancouver Power Company, a subsidiary of the British Columbia Electric Railway Company of Vancouver, B. C., plants on Burrard Inlet, 12 miles from Vancouver; 84,000 h.p. installed in two power houses, 400 ft. head; G. R. G. Conway, chief engineer. The Coquitlam dam is one of the largest and most notable hydraulic-fill dams on the American continent, being 98 ft. high, 850 ft. crest, 40 ft. wide and containing 544,000 cu. yds.

Stave Falls Development of Western Canada Power Company, 36 miles inland from Vancouver, 40,500 h.p. installed, 115 ft. head, ultimate development on Stave River, 100,000 h.p. R. F. Heyward, chief engineer and general manager.

Bow River Development of Calgary Power Company, 50 miles from Calgary, 31,000 h.p. installed in two power houses, 70 ft. head. R. B. Bennett, K. C. M. P., president.

Point Du Bois Development of City of Winnipeg, 77 miles from Winnipeg on Winnipeg River, 26,000 h.p. installed, 45 ft. head, ultimate capacity 88,000 h.p., 500,000 h.p. available from Winnipeg. Smith, Kerry & Chase, designing engineers.

Kakabeka Falls Development of Kaministinquia Power Company, 20 miles from Fort William, Ontario, 24,000 h.p. installed, 180 ft. head, 35,000 h.p. available, energy supplied to municipal plant and Port Arthur system of the Hydroelectric Power Commission of Ontario at 22,000 volts, 3-phase, 60 cycles. W. L. Bird, general manager.

Iroquois Falls Development of Abitibi Power & Paper Company, on Abitibi River, 450 miles north of Toronto, 23,800 h.p. installed, 44 ft. head, energy used at site for paper making purposes, output 225 tons "news" daily. Wm. White, general manager.

Eugenia Falls Development of Ontario Hydroelectric Commission on Beaver River, 4000 h.p. installed, 555 ft. head, 8000 h.p. ultimate capacity, energy supplied to Owen Sound and surrounding country. F. A. Gaby, chief engineer.

Cedar Rapids Development of Cedar Rapids Mfg. & Power Company on St. Lawrence River, 30 miles from Montreal, 108,000 h.p. installed, 31 ft. head, 94,000 h.p. ultimate installation. Julian C. Smith, hydraulic engineer, and R. M. Wilson, electrical engineer.

Shawninigan Falls Development of Shawninigan Water Power Company, on St. Maurice River, 100 miles east of Montreal, 180,000 h.p. installed, 140 ft. head. Julian C. Smith, chief engineer.

Proposed Grand Falls Development on St. John River, 200 miles from St. John, New Brunswick, 80,000 h.p., 140 ft. head. J. B. McRae, designing engineer.

Proposed St. Margaret's Bay Development of Halifax Power Company, 20 miles from Halifax, 6400 h.p. under construction, 90 and 150 ft. head. C. H. and P. H. Mitchell, designing engineers.

THE JITNEY BUS AT SAN DIEGO.

BY W. CLAYTON.

(This excellent summary of the jitney bus situation in the West is taken from a letter sent to Mr. Stephen E. Kieffer, chairman of the Oakland Chamber of Commerce in response to a request for facts. Mr. Clayton is vice-president and managing director of the San Diego Electric Railway Company.—The Editor.)

Time alone will show whether the jitney bus is permanent. In the first place the jitney bus, in a large measure, is due to poor business, hard times and the impossibility of men obtaining work of any kind. Many of these men already owned small autos and went into the jitney business to make a living. Others had saved enough money to enable them to buy an automobile and went into the jitney bus business because no other work was to be obtained. If the jitney men were to make a careful survey of the results of their autobus operation, they would see that they are making no money at all; that the depreciation of the auto eats up all the profits and more. But for the present they are doing something for themselves and their families—their time is occupied and the nickels they take in enable them to eat at the expense of their autobus. Their motto is, "Sufficient for the day is the evil thereof." They cannot make enough money to write off the depreciation of the jitney, and the capital invested in it will ultimately be wiped out except in a very few cases where conditions are unusually favorable and always continue to be favorable. Even in these cases the net return is a bare living for long hours of labor. In many cases the jitney man does not supply the capital. It is furnished by others, as for example:

A man, his wife and child come out and settle in San Diego. Hard times come along. He writes back to relatives and speaks of the difficulty of making a living. His relatives are fairly well fixed; that is to say, they have some money saved. The relative in the case may be a father, mother, brother, sister or cousin. Finally a letter comes in which the man says that if they will send him $250 he can make a first payment on an automobile and go into the jitney bus business; that everybody is making a good living at it and that some take in as much as $15 per day. He states that he can pay all his expenses, and send back some money every month to pay off the principal and interest. Now you know that would appeal to most people. You can readily see that the father or mother or other interested relative, or even an intimate friend, would send on this money. The money may never be paid back. In most cases it will not. In time the automobile is worn out and gone, but in the meantime, a service has been performed. The man has been able to make a living for his wife and child. This kind of argument begs the question. Isn't it a good thing, then? A man, his wife and child have been provided with a living. The answer to this is that our company has let out hundreds of track employes, whom we cannot keep on our construction pay rolls because we cannot make any further investment. These men, their wives and children are starving, or nearly so. Los Angeles street railways have discharged three or four hundred car men for lack of

patronage. Our company will necessarily have to follow suit very shortly. Where then is the gain for all the people of the state? We permit the jitney to run unregulated to help men out of work so they can eat, and the jitney in turn promptly drives other men out of steady employment and deprives them of food for themselves and their families.

As long as we have hard times, we certainly are going to have the jitney bus, if not regulated, until it becomes so unprofitable that a man cannot make "eats" out of it. There will always be new ones, however, coming in to take the place of those who drop out. Nothing cures but experience. Some father or mother or brother or sister, or other relative, will finance the game for the new comer, until such time as the country is so prosperous no man will think it worth his while to run a jitney. I am satisfied the jitney bus cannot pay except under highly favorable conditions, such as very short runs on paved streets, the auto being filled both ways every time.

Now the jitney bus does a great injury to the street car company, because the cream of the receipts go to the jitney. If it is not regulated, it will eventually destroy the street car business. It will reflect so seriously upon the sale of street railway securities, the public will no longer consider them as a satisfactory investment. This will make it impossible for improvements to be made, or extensions to be added, and the service will be gradually cut down to save expense until the street car will be next to a detriment rather than an advantage to a city. And the more cars that go out of service, the more jitneys will come in. In the meantime, the jitney bus will not improve the transportation situation. The jitney bus will not make long runs. It will only take the short ones, as there is no profit in running long distances over unpaved streets into outside districts. It is only the short runs that enable the jitney to make a bare living. In time it will kill off the street car business, because the street cars cannot operate to the outside districts if they get no short haul passengers. Unless the people put the nickels into the street cars, they cannot get service out of them. The street car companies can only give the amount of service the people pay for.

The jitney bus has, of course, some troubles of its own. You can climb on a street car even if it is crowded—you get on somehow. But when you have only jitney bus operation, limited to a legal load because it is dangerous to stand up and if the auto is overloaded it is apt to break down and kill its passengers, its troubles will commence.

In our city it would require 13 jitneys to carry the seating capacity of one of our street cars. We operate 100 cars daily. So it would take a flock of jitneys to handle the business. The jitney starting out on its run will fill and the passenger living about in the middle of the run will be unable to get on. Ten, fifteen or even twenty busses may go by, before he is able to get in one.

If he has his wife or family with him, he will have to wait until a bus comes along with sufficient vacant seats, or he will have to let his wife or his family go in separate machine from the one he boards. Under the present form of unregulated jitney bus operation, his wife or daughter may have the choice of sitting in the lap of a drunken man or having a Chinese sit in her lap. Once aboard the jitney you have little choice as to what is done in the matter.

For a street car, if a seat is to be provided for every passenger in the rush hours, it will cost more than five cents for car fare. In fact, about the only way to give everybody a seat going home at night is to raise the fare from five cents to somewhere between five and ten cents, or put in the zone system, carrying passengers for the short haul for four or five cents and charging those on the long rides up to ten cents.

Everybody knows this kind of thing would not meet with the approval of the American people. Then we are told by a large number of people that the remedy is in municipal ownership. Those who believe in this remedy should go up to San Francisco and ride on the municipally-owned Geary street line during the rush hours. Their cars are just as crowded in the rush hours as they are in any other city. If this condition can be corrected, why isn't it done by the municipally owned railroad in San Francisco—the street railway owned by the people? When you get down to facts (and you seldom do) in the municipally owned railroad, you will learn that a seat for every passenger is too expensive for a municipal ownership road; that the same disabilities that exist in a privately owned line have to be met in a municipally owned road. The only way to get the sort of service wanted is to pay more money for it. There is nothing municipal ownership can do that cannot be duplicated by private ownership, and in ninety-nine cases out of one hundred, private ownership does more for a community than municipal ownership ever can or will do, and it does one thing that municipal ownership does not do—that is, it pays taxes. When you get municipal ownership of public utilities, the people will have to pay all the taxes now paid by the street railways (some millions of dollars), because a muncipally owned railroad does not pay taxes on its railway, or any other municipally owned property.

Speaking of crowded street cars, it is curious that the little Ford can be seen every day with people sitting in the laps of others who are absolute strangers, without complaint. Some stand on the unsteady running boards, a dangerous position, knowing if they are thrown off they have no redress, because the jitney cannot be successfully sued for damages, as it offers no financial responsibility and has no property to attach. The more they are crowded, the greater the danger, the better satisfied the jitney passengers seem to be. And to think that after all the reform legislation we have had looking to the protection of the young girls of America from the wiles of the villain, or the white slaver, with the police lady at all the 5c and 10c dance halls for the protection of young girls, the trapping and punishing of the ogling cigar store masher by the alluring police lady in gay raiment and silk stockings—notwithstanding all this our young girls (and some older ones) are riding in jitneys sitting in the laps of men to whom they are total strangers.

The jitney bus has not given and will not give complete service to all parts of the city for the full

length of the franchise and transfers where necessary for a single fare of five cents from 6:00 a. m. until midnight or later. No transfers is a great detriment to the working man whose home is a fixed point, but whose work place often changes from week to week, especially in the building trades. This means a 10c fare instead of 5c on the street car with a transfer. So far the jitney has failed to give the same service on wet days as on pleasant days. It also fails to give the same service at night in proportion to its day service. At night the service of the jitney bus is negligible. There are a few in the early hours and fewer still or none at all at the late hours. Moreover, the jitney will never run between fixed terminals and give a regular service, because it cannot be effectively controlled other than by such police regulation that of itself could not be made efficient save at an expense that is prohibitive.

No matter what may be ordained by ordinance or legislative action, the jitney bus in the personal ownership of an individual cannot be regulated to give either complete or regular service. If the owner of the bus has a cold and stays home, what process of regulation will force him to hire a man to run his personally owned jitney? If it rains and he says wet weather brings on rheumatic pains and he stays home, what steps can be taken by law, or any other course, to make him give the public a regular, dependable service? If he decides he is not making money, by what means can he be forced to continue to give his portion of a regular, dependable service? There is no possibility of devising any regulation that can compel the independent owner and operator of a jitney bus to do anything more than he desires or is willing to do.

[To be continued.]

EXAMINATION FOR ELECTRICAL EXPERT AID.

The United States Civil Service Commission announces an open competitive examination for electrical expert aid (ship), for men only, on May 12, 1915, to fill a vacancy in this position in the Department of Construction and Repair, Navy Yard, Washington, D. C., at a salary of $4 per diem. Competitors will be examined in mathematics and materials (20 points), practical questions in electricity (30 points), and technical education and experience (50 points). The duties of this position require a theoretical knowledge of all kinds of electrical apparatus used on board naval vessels, capability of preparing specifications and requisitions for electrical material for ships undergoing construction and repairs, making of tests of electrical auxiliaries in use on shipboard, and of estimating the time, material, and cost of making repairs of electrical equipment of ships. Applicants should also have a general knowledge of the laws of electricity and magnetism and a practical knowledge of the design, construction, and testing of dynamos, motors, electrical instruments, material, and electrical auxiliaries used in the distribution and application of electric power on naval vessels, and compiling the results of such tests. Applicants must have had at least three years' practical experience in electrical work.

THE "JITNEY BUS" VS. THE ELECTRIC CARS.

The following advice has been issued to the employes of the Southern California Edison Company and might be followed to advantage by all other employes and employers:

To those in our industry the motto of the Jovians is applicable: "All together, All the Time for Everything Electrical," but beyond business consideration allow me to give you a few reasons why you should not patronize the jitney.

The suburbs of our cities have been made accessible and built up by the electric roads. If all the traffic obtained by them was on their lines beyond the jitney zone, they would operate at a loss, therefore it is unfair not to patronize them on short trips.

The street railway companies are large contributors in taxes to the city, county and state. Should their business be made unprofitable the public must necessarily make up this amount.

It requires 15 to 20 jitneys to furnish the carrying capacity of an ordinary street car. If all traffic depended upon jitneys the congestion would make the streets impassable.

The car companies bear the cost of maintaining from one-third to two-thirds of the surface of the streets they use. If they were put out of business the jitney owners would not assume this expense but it would fall upon the public.

The jitneys do not go into territory sparsely built up or unsupplied by street cars but seek to take traffic already developed by the car companies.

The electric cars give a longer ride for the charge made than any other transportation system.

The car lines are great equalizers of rentals and values. If the entire population of any of our cities or towns was obliged, because of lack of transportation beyond, to live within the jitney (5 cents) zone rentals and values within that radius would materially increase the cost of living. A suburban home would be prohibitive for any one of us without maintaining a private conveyance.

The car lines are limited by ordinances to certain routes, schedules and rates, while the jitneys are unrestricted, therefore the car service is dependable and certain and the jitney service unreliable.

The jitneys will not extend their radius of operation as an accommodation but only on an increased charge.

Recent rulings are to the effect that accidents to an employe, going to or returning from their employment, are not covered by indemnity insurance which all employers are obliged to furnish. Therefore, if you use a jitney on such trips consider the responsibility of the owner before taking the risk, which is about ten times as great in a jitney as in a street car.

Our young women employes should consider that they are much less exposed to familiarity and insult in a street car than in a jitney.

A regulated jitney service may make a useful place for itself, but in an attempt to take the traffic developed by street car companies they are wrong and should not be encouraged.

Think this over. There is a principle of fair play involved, and if you agree with this, use the arguments with your friends.

MANUFACTURE OF OIL GAS.

(This brief discussion on the manufacture of oil gas is intended more for the lay man than the gas engineer. It is taken from Circular No. 32 of the U. S. Bureau of Standards and gives a good idea of the method of making gas.—The Editor.)

An important process of gas manufacture, confined principally to the Southwestern and Pacific Coast States, is the manufacture of gas from crude oil. The magnitude of the industry may be judged from the fact that in 1911, 20 per cent more oil gas than unmixed coal gas was distributed in the United States and 7.25 per cent of the total gas sales were of oil gas.

Oil gas is essentially the product of destructive distillation of a hydro-carbon oil. This accounts for the great similarity in composition of oil gas and coal gas, the former being produced from oil, the latter from bituminous coal, under such conditions that somewhat similar reactions occur. The generating machinery used for production of oil gas resembles markedly the water gas machinery, and the process is also somewhat similar as it is carried out in alternate heating and gas making periods. However, the chemical processes involved and the effect of various factors are so different from those found in the case of water gas that it is undesirable to make comparison with the latter when considering oil gas. Comparison may be made with the carburetting process used in water gas manufacture, but even this has led to some misunderstandings.

There are three distinct processes in use for the manufacture of oil gas: First, the "straight shot process," in which a single shell machine is utilized; second, the two shell process in which the second shell is used only to conserve heat, no gas being made in it; third, the two shell machine in which gas is made in both shells.

There are many variations in each of these processes; for example, the heating oil may be introduced at the top or at the bottom; the making oil may be introduced at the same point as the heating oil or at the opposite end of the machine; gas may be taken off at one end of one shell or at the side of the larger of the two; a secondary blast may be used or not.

The process of making oil gas takes place in alternate periods of heating the generator and of gas making; the heating period is made up of the interval during which the blast (without oil) is introduced to burn out the carbon collected in the machine, and the interval during which oil for heating the machine is introduced. The true making period is followed by a period of purging during which steam is introduced to eliminate the gas remaining in the machine. The total as well as the relative time of these several periods varies greatly in different plants. In addition to this regular cycle it is occasionally necessary to have a long period of blasting in order to more thoroughly burn out the carbon collected in the generator. At intervals of 5 to 10 days it is, in some plants, necessary to entirely shut down manufacture and burn out this carbon under natural drafts.

The temperature maintained in the generator varies with the character of oil employed and with the quality of gas which is to be made. In general, a higher temperature produces a larger quantity of poorer gas; and, within limits, the converse is true that the lower the temperature at which the generator can be operated the higher will be the quality of the gas. This condition results from the fact that the decomposition of the oil into gas is a progressive process.

The heating oil is introduced into the generator with steam or under high pressure without steam; and if properly injected, it enters practically atomized. This fine oil spray is quickly vaporized by the hot checker brick and the decomposition of the vapor begins at once. The higher the temperature to which the oil vapor is subjected and the longer the time at the high temperature the more complete will be the decomposition. Practically speaking, if this decomposition went to completion the oil would be converted into hydrogen and lampblack. As a matter of fact a small portion of the oil is always decomposed in this manner, but of course a much larger part is decomposed only into those hydrocarbon gases which make up the methane, ethylene and benzene series. In addition there are also formed complex hydrocarbons, such as napthalene.

The significance of this successive decomposition is apparent if we consider that a specification of a certain heating value for the gas will necessitate that the generator be operated at such temperature as to produce gas at least of the richness specified. The standand fixed is therefore a determining factor in controlling the works operation. Moreover, if the quality be fixed too high it will be found that certain difficulties of operation are introduced because of the low temperature which must be maintained in the generator. For example, when operating at a lower temperature a smaller amount of lampblack may be made; but this as produced is mixed with more or less of the difficulty removable tar and the resulting tar and lampblack mixture is difficult to handle. This trouble is met particularly in the case of the straight-shot machine. Another difficulty met under these conditions is the larger amount of carbon which is deposited in the generator and the resulting increase in the frequency with which the machines must be "burned out."

The numerous variations in detail make it impossible to give any generalizations as to the present operating practice in many particulars. However, two particular points on which striking differences in operating practice have been noted should be considered in connection with standards for oil gas service. The first of these points has to do with the method of introducing the oil into the generator, the second with the manner of handling the gas in wash boxes and condensers.

With care it is possible to introduce the oil in a very fine spray, which permits almost immediate vaporization in the generator; practically none of the spray drops in liquid form into the checker brick, and thus the "stewing" of the oil is eliminated. It is essential, as is recognized by all water gas makers in connection with the carburetting process, that the oil be immediately vaporized when it enters the hot checker brick or the liquid will be greatly superheated in some parts and very incompletely heated in others before it can be converted into gas. The result of this

socalled "stewing" is the production of a tar very difficult to handle, the carbonization of the checker work with resulting lowering of generator efficiency, and a general operating difficulty due to irregularity of temperatures throughout the generators, a condition which is most detrimental to good operation.

When the gas leaves the generator it carries suspended in it a considerable amount of lampblack, varying in quantity from 5 to 50 pounds of carbon per 1000 cubic feet of the gas. It also carries a considerable amount of tar and napthalene, which also must be eliminated before the gas can be purified and placed in the holder. The gas leaving the generator bubbles through water in the wash box, and most of the lampblack is separated from the gas by this process. Proper operation at this point will eliminate subsequent difficulty in condensing; if the gas is not properly freed from lampblack in the wash box, the mixture obtained in condensing is made up of tar, water, and lampblack in proportions that are very difficult to separate and handle. Notable progress has been made in operation of the wash box in some of the California plants where the gas is passed for the distance of 5 to 15 feet under water in order that practically all of the lampblack may be removed before the gas enters the scrubber. This elimination of lampblack greatly facilitates condensing and results in the production of a tar which can be easily handled.

Considerable attention has been given to the two points above, since one of the most important points to be considered in the adoption of a heating value standard for oil gas has been whether or not a company could operate without serious works difficulty when making a gas of moderately high heating value.

INSIDE WIRING METHODS

By JOHN CARRELL

Electric Fixtures.

The ancient times afforded very little light for individual homes to temper the darkness of their night but at intervals emperors or potentates arranged elaborate lighting schemes in pubic gardens or amphitheaters that citizens might clearly see their devotion to the public cause. Much energy was expended to provide new and unique designs for torches or other sources of light. Today live fixture men burn with desire to please the aesthetic or fastidious eye in the matter of assembling lamp holding devices on cleverly arranged supports which will at once be ornamental, and give correct distribution and diffusion of light. In the home of today there is light in abundance.

The modern electric fixture has been revolutionized in design because of the introduction of the tungsten lamp. Some features of development are the use of semi-direct and indirect lighting schemes, and the passing of combination gas and electric fixtures; also the flooding of large rooms from concealed light sources would seem to preclude the further extensive use of especially massive pendant fixtures.

To satisfy the demand created for new types of fixtures due to the decrease in the cost of light, fixture men brought forth many novel designs and the ease by which the modern process work and clever imitation of the more expensive materials converted designs into realities, served well. So varied have been the successive designs in the new path of development that many business men declare that fixtures will soon be changed periodically to suit the whim of fashion. But the artist followed the code of beauty in making the designs which will be perpetuated and knows that when made graceful in proportion, when refined in contour and when perfect in execution, the subject treated is beautiful and that fact, like other material facts, does not change. The Greeks and Romans created certain ornamentations which has permeated the art of each succeeding civilization and on our lighting fixtures we find the vitruvian wave, the guilloche, the palmette or honeysuckle, the water plant and arrow and other ancient creations, changed only to meet basic conditions. Should the men of ancient Athens, of Corinth or of Rome return to earth they would see much evidence of their handiwork in the subtle diffusion of the modern light.

Fixtures are usually made of metal, hardwood or of a compositno resembling papier mache, termed compo. They are required to be constructed so as to insure requisite mechanical strength. Non-metallic fixtures are equipped with metal wire ways unless armored conductors are to be used.

Wire ways are made smooth and provided with metal fittings having rounded edges, at points where wires are to protrude through partitions or from the wire way.

Arms of metal fixtures are secured in place by brazing, soldering or with threaded joints. Where threaded tubing is employed the minimum thickness used is No. 18 B. & S. gauge and joints are made with five or more threads engaged and locked. Other than this there is no specific provision pertaining to weight or strength of material.

Lamp sockets are classified according to the size of lamp bases, as miniature, candelabra, medium and mogul. Certain wattage limits for the lamps designed to be used in the respective bases are observed by manufacturers. Miniature sockets are used for Christmas tree or similar decorative lighting outfits; the candelabra type where the lamp holding devices are made to represent candles or where small bases are desired, and the mogul type for lamps of large capacity having bases nominally ½ in. in diameter. Receptacles having exposed current carrying parts are not used on fixtures unless completely surrounded with metal. Sockets and receptacles may be secured to the structure of the fixture in any reliable manner.

Insulating joints are inserted between fixtures and their supports where fixtures are attached to metallic armor systems, gas piping or grounded metal work or where installed on surfaces of metallic construction except for straight electric types in which all wires have the same thickness of rubber insulation

as required for wires of the branch circuit and in which the live lamp holding parts are surrounded with porcelain or similar insulation.

Insulating joints are formed with metal pieces interlocked but separated with a stratum of insulating material and are made to withstand considerable twisting effect. The body will resist the action of gases or of ordinary flame and the exterior finish is of a waterproof insulating compound. They are provided with nipples to be screwed on gas pipes, studs and fixture tubing. Insulated studs are also made to be attached to surfaces by means of screws or bolts.

Canopies of fixtures with which insulating joints are used are separated from outlet boxes, from metallic surfaces and from all surfaces in fire-proofed buildings by strips of insulating material; the strips are secured to the canopies with rivets, small bolts or by equivalent means.

Wires for fixtures are No. 18 gauge minimum and have a rubber covering; but for fixtures liable to contain heat in excess of 120 degrees F. slow burning or asbestos covered wire is used. Where fixtures are wired on the outside, stranded wire having an insulation of rubber 1-32 in. in thickness is required. Wires and splices should be kept free from grounded parts of gas pipes. Those on the same fixture should not be connected to a potential in excess of 300 volts nor to different systems. Tests should be made for wiring defects before installation.

Flexible cord, or paired, stranded conductors, each having an insulation of rubber and an outer braid of silk or cotton, may be used to suspend a single lamp socket, making a form of pendant for use in dry places. The cord leaves the outlet box cover, and enters the socket inlet through insulating bushings. To relieve screw connections or soldered joints from strain, knots are tied in the cord and inserted under the socket cap and in the outlet box or point of suspension.

Portable cord, or flexible cord reinforced with an outer covering, is used to connect portable lamps or movable fixtures. Where appearance is a feature the extra cover may consist of a silk or cotton braid; but if the conditions of service are severe, different forms of reinforced cords, having insulation and abrasion braids designed to resist dampness, grease, etc., as the case may be, are used. Reinforced cord because of large overall diameter requires a socket having an inlet for a ⅜ in. bushing.

Hazardous locations require special treatment, sometimes with respect to the construction of the fixture, sometimes as to the wiring or type of socket used.

Damp places or where corrosive vapors exist, require weatherproof sockets especially designed for the location. When not made up on fixtures they are hung on stranded No. 14 wires which are soldered to the circuit wires but supported independently. Fixtures installed out of doors are made sufficiently watertight to prevent the entrance of moisture to wire ways or socket shells.

Where inflammable gases exist sockets and lamps are enclosed in vapor tight globes supported on pipe hangers and wired with No. 14 wire. Key sockets are not used near inflammable material.

In show windows, fixtures with exposed wiring and flexible cord, unless armored, are not used.

In recent years there has been a tendency to place incandescent lamps out of reach of washstands, bath tubs, etc., so that persons may not accidentally receive shocks while in contact with water piping. When lamps must be near grounded piping porcelain sockets are placed on fixtures and controlling switches installed. Safety first.

ELIMINATING THE GASOLINE ENGINE.

One of the chief aims of the electrical salesman is to supplant gasoline engines with electric motors wherever and whenever possible. The accompanying illustration is an example of how the Wenatchee Gas & Electric Company of Wenatchee, Wash., accom-

The Triumph of the Electric Motor.

plished its purpose for a pumping plant on the banks of the Columbia River. At the left of the picture two entering wires are sufficient to explain the reason for the "swan song" of this particular installation.

Some of the central stations of Southern California make it a practice to buy up gas engines and ship them to communities which have not the advantages of electric service. Of course a motor is installed to take the place of every discarded engine.

ADVERTISING AMERICAN MACHINERY IN CHINA.

At a recent meeting of the American Association of North China a resolution was passed asking American manufacturers of machinery to follow the practice of British manufacturers in sending machinery to Chinese technical schools and universities for their use, as a means of advertising American machinery and bringing it into favor with the Chinese students, who, on account of their familiarity with the machinery during their school days, will be inclined to favor its use in fields to which they may be called later in life.

THE ELECTRICAL EQUIPMENT OF THE AEROSCOPE.

BY PAUL C. BUTTE.

The readers of this journal know what it means to design an entirely new and original piece of apparatus; they will understand the great chance of failure where experiment is not permissible and where there is no precedent to work from as a guide. They will appreciate the great amount of care and study required to avoid failure and also the boldness in this undertaking where thousands of dollars are involved, as was the case with the aeroscope, one of the concessions at the Panama-Pacific International Exposition.

Mr. John Strauss, the well known bridge engineer, created and designed the entire structure in his offices in Chicago. The steel work and machinery was fabricated and built in Waukesha, Wisconsin, the electrical apparatus was built in Pittsburg and San Francisco, the substructure was erected by a San Francisco contractor, the steel work by a Seattle contractor and the concrete work and passenger houses by different San Francisco contractors. And when the parts were put together, each and every piece fitted to a nicety, the entire machine went into true alignment, and on the first day of operation over 5200 passengers were successfully carried.

The principle of operation of the aeroscope is that of a balanced beam 252 ft. long from end to end, pivoted near one end. The short end of the beam contains a large block of concrete, which counter balances a house at the opposite end for carrying passengers. The steel tower containing the trunnions in which the beam pivots, is revolved about a circular track. In other words, two motions are produced, one revolving about a vertical axis, the other revolving about a horizontal axis. These motions are controlled separately in either direction. It is obvious therefore, that when both of these motions are worked simultaneously, a spiral motion is imparted at the end of the beam.

Considerable thought was given toward a practical plan to keep the beam balanced, as a slight unbalancing at the long end of the arm would necessarily mean considerable power for operation. This was accomplished by fastening two steel tanks containing water on the bottom of the passenger house. When the passengers board the house the arm would move downward within a limit distance of 2 in. engaging with a lever which would automatically open a valve allowing just enough water to flow out of the tanks to make up for the difference in weight. In case the arm became too light it would raise to close a contact controlling a 3 h.p. motor direct connected to a centrifugal pump, and the water would be pumped back into the tanks again. The scheme worked out very successfully and the balance obtained is surprisingly accurate.

Inasmuch as it was very essential to avoid accidents of any kind, limit devices were placed at a number of points. The general principle followed was to rely primarily on the operator to perform all functions manually; but in case he failed to attend to his duties properly the apparatus would automatically operate to stop the aeroscope.

The following limit devices were provided:

1. At the completely lowered position.
2. At the same swinging position above houses.
3. At the completely raised position.
4. At the safe lowering position above houses.

In addition to these automatic devices, the following lamp indicators were provided:

1. Completely lowered position.
2. Nearly lowered position.
3. Position to lower arm.
4. Safe swinging position.
5. Nearly raised position.
6. Completely raised position.

As a check on the above indicators, a mechanical indicator was also provided. Each of the four doors in the passenger house is provided with a contact arranged so that it will be impossible for the operator to start up unless all doors are closed. This is accomplished by connecting the coil circuits of the main line contactors through the door contacts before reaching the master controllers. To further prevent accidents a telephone system is installed between the operator and the conductor in the passenger house and communication is carried on before a start is made.

The Aeroscope.

The power wires are carried through a set of collector rings and are extended to the operator's house inside the tower structure. The electrical equipment consists of the following motors:

Four 20 h.p. 3-phase slip ring induction motors for revolving the tower.

Two 11 h.p. 3-phase slip ring induction motors for raising the arm.

Two 3 h.p. squirrel cage motors for operating fans near one end of arm for decorative effect.

One 3 h.p. squirrel cage motor for balancing pump.

Each of the six larger motors is provided with a magnetic brake and in addition thereto emergency foot brakes are provided.

In order to evenly distribute their torsion the four 20 h.p. tower motors and the two 11 h.p. motors are started and stopped simultaneously in two groups. This is accomplished by using starters of the contactor type, controlled by a single master for each group of motors. It makes a more positive and reliable scheme than using the drum type of controllers grouped together mechanically, which was the original plan. The entire electrical equipment was furnished and installed by the Butte Engineering and Electric Company of San Francisco.

The accompanying photograph gives an idea of the massiveness of construction. The entire structure is exceptionally rigid and every possible precaution was taken to prevent failure of any of the parts. It contains over 325 tons of steel and about 400 tons of concrete. The capacity is 118 passengers, and making one trip going up and down in ten minutes. The passengers are raised to a height of 260 ft. above the street. This height is equal to that of a 22 story building and the ride at this elevation is most thrilling.

TURBINE ACCIDENT REPORT.

The electric railway lines of the Southern Pacific Company in Berkeley and Oakland, California, were out of service for a few hours on the morning of February 16, 1915, because of the failure of both steam turbines in the Fruitvale power station. On February 19th a board of inquiry was convened at the superintendent's office in Oakland for the purpose of determining the cause of and responsibility for this accident. This board consisted of J. C. McPherson, superintendent; A. H. Babcock, consulting engineer; J. A. Tillman, chief engineer and J. Johansen, chief operator, as representatives of the Southern Pacific Company, and A. H. Halloran, managing editor Journal of Electricity, Power and Gas, and Wynn Meredith, consulting electrical and steam engineer, as representatives of the public. After a thorough investigation their conclusions were as follows:

This board finds that the delays to trains on the morning of February 16, 1915, were caused by the simultaneous failure of both turbines in the Fruitvale Power Plant and consequent inability to furnish a full supply of energy for the electrically driven trains. This is the first time that Fruitvale Power Station has been unable to furnish an adequate supply of power since it was opened for business June 1, 1911.

The trouble began by No. 2 turbine losing 6 blades of the impulse element some time during the morning of February 15th. The load was transferred to No. 1 and was carried all day in the usual manner. On starting No. 1 turbine on the morning of the 16th it failed by losing practically all of the blades of the intermediate stage; and for the reason that No. 2 turbine was then open to have the 6 blades replaced, the station was unable to carry the load, because frequency changer, which affords the only connection between Fruitvale Power House and the Great Western Power Company is of size sufficient to carry only the Alameda trains. No. 2 turbine was put together as fast as possible and the machine was placed in operation at 10:25 a. m. and full service was resumed on all electric lines 11:00 a. m., February 16th. The cause of the loss of blades in No. 2 turbine has not yet been ascertained, principally because the condition of No. 1 does not permit No. 2 to be shut down for a complete investigation. The cause of damage to No. 1 turbine is the rusting of the metal in which the blades are secured, so that some came out and having been struck by the moving blades they in turn ripped out each other until all of the intermediate stage blading has been destroyed.

The rusting above referred to is far more than has been experienced ordinarily in the use of such turbines, and in the opinion of this board the excess rusting is due to a slight leakage of steam past the throttle when the machine is stationary. It is considered that throttles operated under plant conditions cannot be kept absolutely tight, but arrangements have been made so that, in future, this steam leakage will exhaust to atmosphere instead of into the turbine casing, and thereby will remove from the turbines the principal causes of rusting. The normal amount of rusting will be prevented by the introduction of brass lining strips. When these turbines were designed experience had not shown the necessity for these brass liners which the Westinghouse people now recommend.

It is the opinion of this board that there is no responsibility for the accident attributable to the actions or negligence of any of those concerned with or responsible for the operation of this plant. It is the further opinion of this board that after completion of the repairs now being made, the remedial measures that have been placed in effect already will reduce to a minimum, probable recurrence of this or similar accidents. Complete immunity from shut-downs in this plant can be secured by the installation of a third unit at a cost of approximately $130.000. This board does not recommend such an installation for the reason that had it been made originally, the fixed charges on the additional investment would have amounted to many times the sum lost in this first shut-down of the plant. An adequate connection with one of the power companies would cost approximately one-half as much as the additional turbo-unit would cost, but this board does not recommend even this investment for the same reason, and also for the additional reason that, owing to the uncertainty of operation of long hydroelectric transmission lines, there would not be nearly so great a measure of security with this connection as with the additional turbo-unit.

The Japanese machinery market still continues dull. No orders are yet forthcoming for spinning machines, the suspension of spindles being still enforced in many silk mills, and this despite the recent slight improvement in the raw-silk and cotton-yarn market. The sawmills are still quite reserved in their production, and no sawing machinery is demanded. As to the parts of various motors and engines, the demand is also weak, the repairing of these engines being of a temporary nature. As regards importation, American machinery has now replaced the continental supply since the war started. In spite of the meager demand here, it is noticeable that the price is on an increasing tendency because of the rise in the price of iron.

INDUSTRIAL USES OF FUEL OIL

BY F. B. DUNN.

Oil Fired Metallurgical and Shop Furnaces.

[Concluded.]

One of the most successful blast furnaces operated with fuel oil is a melting cupola invented by Mr. Wallace Dow, of the Dow-Diesel Engine Company, Alameda, California. With coke costing $18 per ton at his factory, and oil only seventy cents per barrel, he decided to experiment with fuel oil in a cupola which increasing business made necessary. Fig. 77 shows the design which he adopted; its success and economy have been remarkable.

As may be seen by reference to the drawing, complete combustion is accomplished before the fuel enters to the cupola. A small combustion chamber on one side is operated by one burner, the flame of which attacks the charge at the base of the shaft. On the opposite side is a larger chamber, operated with two burners projected at angles, the top burner being pointed downward towards the bath and the side burner pointing toward the bottom of the shaft. With the former burner operating alone, the metal can be kept fluid until ready for pouring. In this manner the heat is concentrated at the "fusion zone." No trouble has been encountered as a result of the charge falling down, as the heat is concentrated at one point, and the material does not become fluid until it passes the fusion zone. It will be noticed that the furnace inclines slightly towards the pit or bath, from which the metal can be drawn off as required. In operating the furnace is first brought up to the required tempera-

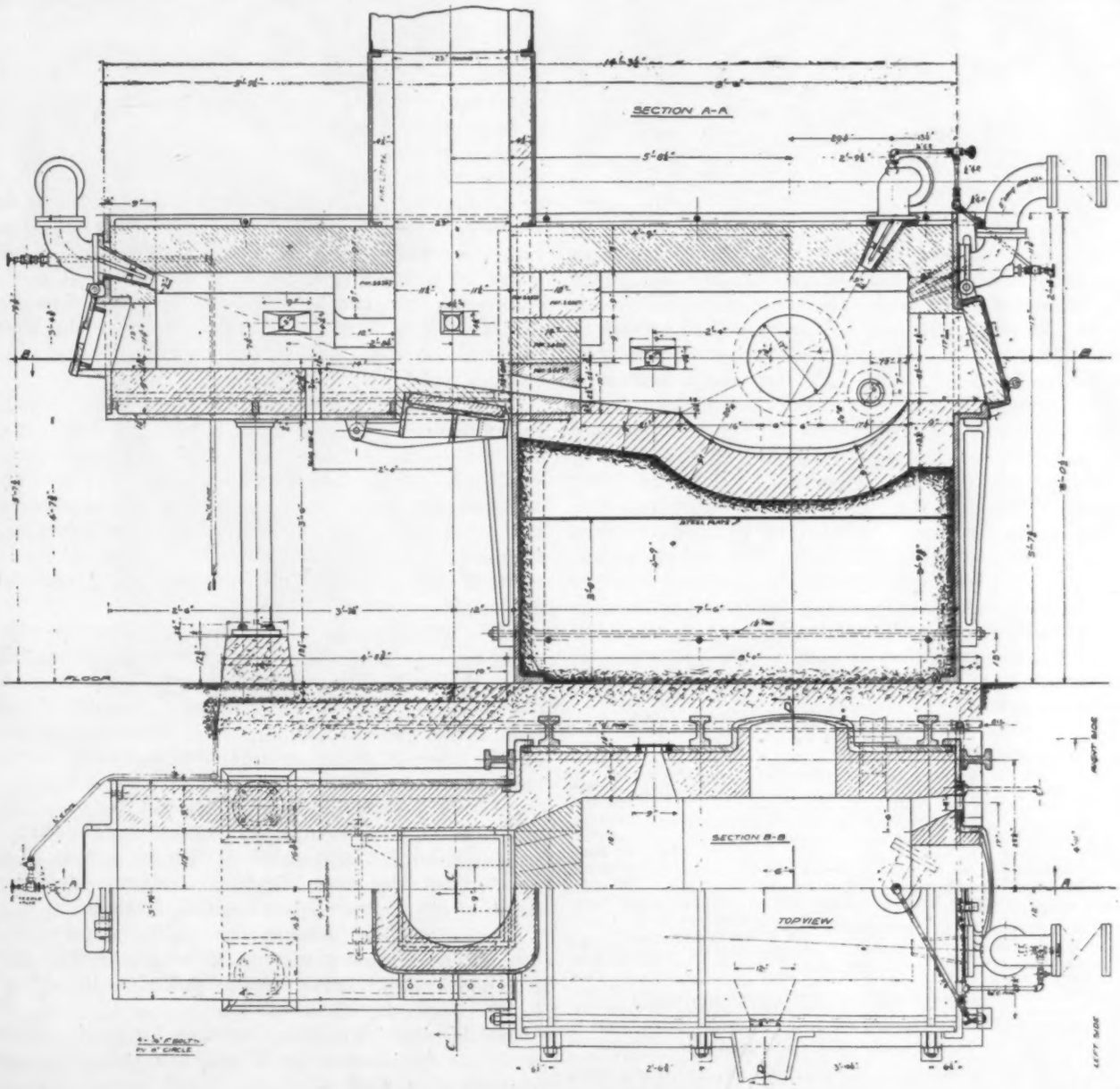


Fig. 77. Dow Oil Smelting Furnace.

ture, all burners being used. The air required for the blast is furnished by means of an electrically driven No. 4 Root blower, an air pressure of 8 oz. being used while heating up the furnace. After about 40 minutes the charge is introduced in the regular manner, and the air pressure increased to 14 oz. The temperature of the furnace can be easily regulated; white cast iron requires about 2100 degrees F., and gray cast iron about 2300 degrees F. The capacity of this furnace is 4 tons per hour; the amount of oil consumed is 20 gal. per ton of castings. The operation has been completely successful, melting each day the amount of iron required. Not only is money saved, but valuable space and labor as well. The molders do not have to wait for a heat, for by the use of the auxiliary burner the charge can be kept ready to pour for many hours.

Table of Determinations.

Oil as Fuel.

	Per cent
Silicon (Si)	2.27
Graphite carbon (C)	2.51
Combined carbon (C)	.51
Phosphorus (P)	.78
Sulphur (S)	.059
Manganese (Mn)	.57

Coke as Fuel.

	Per cent.
Silicon (Si)	2.46
Graphite carbon (G)	2.41
Combined carbon (C)	.36
Phosphorus (P)	.79
Sulphur (S)	.111
Manganese (Mn)	.53

The above analyses, made by Smith, Emery & Company, chemical, inspection, and testing engineers of San Francisco, show clearly that the quality of the cast iron produced by the oil operated furnace is better than that produced by the coke fired furnace.

The graphite and combined carbon in the coke operated furnace totals 2.77 per cent, against a total carbon of 3.2 per cent in the oil operated furnace, or approximately 10 per cent increase in carbon. The decrease of sulphur in the oil operated furnace is also important, being less than one-half that of the coke operated furnace. Sulphur causes the carbon to take the form of combined carbon; increases hardness, brittleness, and shrinkage, and also has a weakening effect. When silicon is below 1 per cent, even 0.06 per cent sulphur makes the iron dangerously brittle. The advantage of low sulphur and high silicon is thus apparent. The following reports show typical operating conditions in plants in different parts of the country:

Pacific Coast Plant.

Size of furnace	25 tons
Duration of run	24 hrs.
Atomizing agent	steam
Steam pressure	60 lbs.
Oil pressure	45 lbs.
Oil temperature	85° F.
Total oil consumed	27 bbls.
Total weight of charge	27 tons.
Gallons of oil per ton	42 gals.
Heat units of oil	18,500 B.t.u.

Southern Plant.

Size of furnace	30 tons
Duration of run	24 hrs.
Atomizing agent	air
Air pressure	25 lbs.
Oil pressure	25 lbs.
Temperature of oil	78° F.
Total oil consumed	1255.5 gals
Total weight of charge	31 tons
Gallons of oil per ton	40.5 gals.
Heat units of oil	18,650 B.t.u.

St. Louis Plant.

Size of furnace	40 tons
Duration of run	24 hrs.
Atomizing agent	air
Air pressure	30 lbs.
Oil pressure	35 lbs.
Temperature of oil	120° F.
Total oil consumed	1661.75 gals.
Total weight of charge	42½ tons
Gallons of oil per ton	39.1 gals.
Heat units of oil	18,740 B.t.u.

It will be noticed that there is a difference of about three gallons of oil per ton of steel between the Pacific Coast and the St. Louis plant. While the oil used by the St.Louis plant has a slightly greater heating value, it is not sufficient to warrant the difference in consumption. The type of burners used being much the same, the larger furnace is evidently more economical than the smaller one.

Furnaces for General Use.

The average jobbing shop uses pit furnaces, the crucibles holding about 200 lbs. A few large manufacturing plants, outside of the rolling mills, still use pit furnaces, but these are, almost without exception, those whose castings are so small or so thin that the drop in temperature due to pouring into a ladle from a tilting or tapping furnace cannot be allowed. The great majority of the manufacturing plants whose aim is large production use tilting or tapping furnaces on account of their greater speed. Few of the users of tilting crucible oil furnaces, tilting oil flame furnaces or oil fired reverbatory furnaces come into the small jobbing class. Most of the large manufacturers, except the rolling mills, use oil on account of the great speed of melting possible with its use, and in this connection it should be noted that the open flame, oil furnace seems to come nearest to meeting the needs of the large manufacturer who must melt large quantities of red brass.

Fig. 78 illustrates a portable semi-muffle furnace for annealing or general hardening. It is mounted on a self contained oil burning system, requiring only a small amount of compressed air for operation. This air is used to force the oil to the burner, and also constitutes an atomizing agent for the oil. Self-contained furnaces of this type are installed in shops where the work does not warrant the installation of a complete oil burning system.

Fig. 79 illustrates a portable fuel oil burner which gives an intense flame. It is used in many machine shops, boiler and locomotive shops and foundries, for pipe bending, plate bending, starting cupolas, drying moulds and general heating. It is self-contained, and requires but a small amount of compressed air for operation.

Notes from Practice.

A reverbatory furnace 5 x 2½ ft. was brought to a temperature of 2700 degrees F. with 2.8 gallons of oil.

Wagon tires from 2 in. to 4 in. wide require about 5 gal. of oil per hour when treating 30 tires.

In a crucible furnace, three 150 lb. pots were brought to a temperature of 3200 degrees F. with 5 gallons of oil. A brass furnace melted 40 lb. of brass in 30 minutes on 6 lb. of oil.

A forging furnace has handled 1 ton of material ready for the hammer on 22 gallons of oil. This was average shop work.

A bolt heading furnace turned out 600 1¼ in bolts per hour on 6½ gallons of oil. The bolts were 6 in. long, consequently the fuel consumption was only 10.4 gallons of oil per ton of material. The same furnace, operating two machines, heated ¾ in bolts at the rate of 1380 per hour. A large rivet heating furnace has heated 600 rivets an hour on a consumption of 3 gallons of oil, and an annealing furnace

Average Results With Oil in Tilting Furnaces.

Material.	oz. Weight.	Heats per day	Oil per 100 lbs.
White cast iron	350	4	2½ gals.
Gray B iron	350	4	2½ "
Copper	450	5	1¾ "
Gun metal	450	7	1½ "
Red brass	450	6	2 "
Yellow brass	450	8	2 "
Steel	132	3	14 "
Nickel	114	4	13 "
Maleable iron	170	4	5 "
Aluminum	500		1½ "
Silver	1000	1	4 "

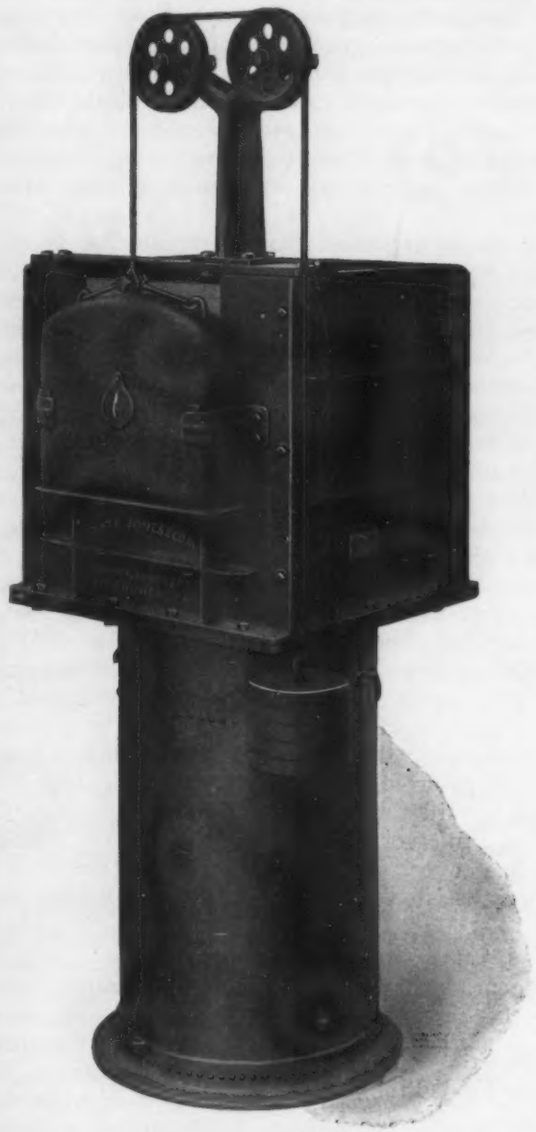


Fig. 78. Portable Semi-Muffle Furnace.

treated 1 ton of material on 10.5 gallons of oil.

In an air furnace, the time of getting out a heat was greatly reduced, and the capacity of the plant increased by the use of oil. One malleable iron foundry which used 1000 lb. of coal per ton of iron and took ten hours to a heat is now using 50 gallons of oil per ton of iron and running heats in less than five hours. In general blacksmith practice at the Mare Island Navy Yard an economy of 60 per cent in fuel cost was effected, 40 per cent more work was done by the same number of men with oil instead of coal fuel. A piece of armor plate 10 ft. long, 4 ft. 6 in. wide, and 6 in. thick, was heated in eighty minutes, the job requiring eight hours when coal was used as a fuel.

Fig. 79. Portable Fuel Oil Burner.

Comparative Results With Coke Furnace and With Oil Furnace.

Alloy No.....	Analysis.	Coke furnace. Time of heat.. H.	M.	Metal charged Lbs.	Metal lost.... Per cent.	Oil furnace. Time of heat.. H.	M.	Metal charged Lbs.	Metal lost.... Per cent.	Average metal loss. Per cent.
						1	45	1,003	0.4	
1	.....	.....		...	...	1	20	1,000	1.0	0.7
		2	30	212	0.2	1	25	1,000	0.8	
						2	5	842	4.1	
2	.....	3	45	207	7.0	1	30	840	6.3	5.2
3	.....	3	30	208	15.0	1	35	840	7.3	7.3
							55	500	1.2	
4	.....	2	30	250	3.2	1	15	500	2.3	1.6
						1	45	538	1.4	
						1	35	600	1.0	
5	87 Cu, 5 Zn, 5 Sn, 3 Pb.	4	00	274	0.9	1	0	606	1.8	1.6
						1	10	587	1.8	
						2	0	1,459	2.8	
6	Red brass..	3	30	250	3.3	2	0	1,460	3.8	3.3
						1	50	1,220	3.5	
						1	0	722	0.6	
7	.....	2	30	250	1.6	1	5	800	1.1	1.0
							45	598	1.3	
						1	20	708	3.1	
8	.....		45	249	0.6	1	0	810	2.3	2.8
						1	10	803	3.2	
						1	35	800	1.9	
9	.....	3	30	262	1.2	1	5	777	1.7	1.7
						1	30	762	1.5	

Total average loss in coke furnace, 3.42 per cent; in oil furnace, 2.48 per cent.

Average output of metal from coke furnace, 81.6 pounds per hour; from oil furnace, 591 pounds per hour.

High pressure gas lamps are used to light the state and foreign building section of the Panama-Pacific International Exposition, and as an auxiliary illumination throughout the grounds. The ornamental gas standards are 20 ft. high, being topped with a two-mantle lamp.

JOURNAL OF ELECTRICITY
POWER AND GAS

FOUNDED 1887

PUBLISHED WEEKLY BY THE

Technical Publishing Company

Crossley Building, San Francisco

E. B. STRONG, President and General Manager
A. H. HALLORAN, V. P. and Managing Editor
A. M. HUNT, Treasurer and Special Contributor
C. L. CORY, Secretary and Special Contributor
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Single Copies, Current Month	each	.25

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CONTENTS

Canadian Hydroelectric Exhibit 307

The Jitney Bus at San Diego 309
By W. Clayton.

Examination for Electrical Expert Aid 311

Manufacture of Oil Gas 312

Inside Wiring Methods 313
By John Carrell.

Eliminating the Gasoline Engine 314

Advertising American Machinery in China 314

Electrical Equipment of the Aeroscope 315
By Paul C. Butte.

Turbine Accident Report 316

Japanese Machinery Market 316

Industrial Uses of Fuel Oil 317
By F. B. Dunn.

Editorial 320
Breaking Down the Barriers.
An Enlarged Field for Fuel Oil Appliances.
High Voltage Measurements for Therapeutics.

Convention of National Electrical Contractors' Association .. 323

Personals 322

Meeting Notices 322

News of California Railroad Commission 323

Publications Received 323

Industrial 324
The Electric Solution of the Internal Transportation Problem.

News Notes 325

High Voltage Measurements for Therapeutics

That Maxwell lived to deduce mathematical equations which proved profoundly the existence of electric waves and yet died without ever being able to verify experimentally his deductions; that Hertz later experimentally established conclusively the existence of electric waves, yet died without seeing their application in the transference of intelligence by methods today known as wireless telegraphy and wireless telephony, but illustrate the conception, growth and full-orbed evolution of human knowledge.

Previous comment has been made in these columns relative to the recent high voltage potentiometer of Professor Ryan that is proving today of such value in high voltage power transmission investigation.

It is to be regretted that more tangible knowledge has not as yet been gathered connecting electrical measurements and electrical therapeutics. To make electrical therapeutics an exact science more should be known relative to quantitative measurement of high voltages and high frequencies.

Immense strides have been made during recent years in the application of electricity to the healing of the human body. Too little, however, has been established relative to actual quantitative measurement of the electrical quantities involved.

Two things have contributed to this lack of knowledge. In the first place, electrical therapeutics is largely controlled by medical investigators who are ignorant of electrical measurement and in the second place apparatus to properly accomplish this measurement has never for the most part been designed.

A nearer interlinking of the medical man interested in electrical therapeutics with the practical and theoretical knowledge of the electrical engineer will do much toward obviating the former, while an application of Professor Ryan's established high voltage potentiometer to electrical therapeutics would undoubtedly assist wonderfully in accomplishing the latter.

An Enlarged Field for Fuel Oil Appliances

The production of fuel oil on the Pacific Coast during the past decade has now reached such enormous totals as to represent approximately twenty-five per cent of the world's output. Not only has this production made possible cheap steam power for electric generation, but countless other applications are daily making their appearance on the market. The series of articles by F. B. Dunn on Industrial Uses of Fuel Oil that have been appearing in these columns for some issues, set forth this fact in a complete and comprehensive manner.

When oil first made its appearance on the Pacific Coast it was with much trepidation that railroad operators and central station managers decided to attempt its use for fuel supply. Oftentimes ample space and apparatus were left conveniently by, so that a rapid change back to the old system could be accomplished. The Fruitvale Station of the Southern Pacific Company is an example of this. In that installation one may see where storage space for coal has been left in

case oil should become unprofitable as a fuel.

Today, however, the production of oil is on such a gigantic scale and its development in hitherto unthought of fields, is so widely dispersed that the permanency of this type of fuel is as assured as the production of coal.

A striking instance of this ever widening field of production over the West and the Pacific alignment of influence is that of the Akita oil field in Japan. Although the Japanese imports of oil totalled 26,414,278 gallons valued at $3,188,108, during 1914, Japanese industrial development has depended largely upon water power and coal. Due to her smallness of area the former is somewhat limited in output and the latter commands a price in the Orient at such a figure as to be an impediment to cheap power production.

The appearance of a gusher on the northwest coast of Hondo, the principal island of Japan, spouting forth daily enormous quantities of oil, rightfully created considerable excitement on the Tokyo stock exchange during the past year. So violently did this news rock the status of Japanese securities that the national exchange was forced to close its doors for the day.

Here, then, is a ready and open possible market for industrial fuel oil appliances. Undoubtedly Japan is to experience during the next ten years the same impetus in fuel oil consumption that California and the Pacific Coast states have undergone during the past decade.

The handlers of fuel oil appliances and engineers familiar with fuel oil economies should now be alert to this immediate opportunity for expanded endeavor.

Breaking Down the Barriers

James Bryce, probably the most noted observer of American manners and customs, once said that the Pacific Coast might naturally have been the home of a separate nation. But the natural barriers which would have isolated an ancient people, even as the Pyrenees have shut in some of the provinces of Spain, are being rapidly broken down by the effects of modern civilization.

These natural barriers are largely responsible for the well-marked peculiarities of this region and its people. The West is different because it has been more or less separated from the rest of the world by the vast ocean to the west and the great mountains to the east. Distance from other centers and difficulties of access have tended to accentuate the inherent independence of thought and action which characterized the hardy pioneers and their descendants who peopled this region.

From the physiographic standpoint these differences are fundamentally due to the fact that the Pacific Coast is the newest part of the American continent, which also partly accounts for the height of the mountain ranges. While on their western slopes the mountains condense the moisture to enrich the fertile valleys of the Pacific Coast states, on their eastern slopes much is barren and arid. Looking east and south from the summit of Mt. Whitney, the highest point in the United States proper, it is possible to see into the depths of Death Valley, the lowest point. Looking west from the summit of the Sierra-Cascade ranges are the deep forests and dashing streams which distinguish this region.

In the deserts to the east are found some of the oldest records of animal life. In early geological periods here roamed the three-toed horse. In the forests to the West also, close to the frontier of modern civilization, recently has been found the last remnant of an Indian tribe still following the primitive customs of the stone age.

Small wonder is it then that the people who overcome the natural obstacles surrounding this favored locality have been untrammelled by tradition. Unfettered by precedent they have been free to develop new social and political institutions. Experiments are being made with new forms of government, the initiative and referendum, the recall, the direct primary and direct election of senators. Some of these experiments are successful, others are not. Several are moving eastward.

This eastward movement has been made possible by the gradual breaking down of the natural physiographic barriers by new methods of communication and transportation. The railroad, the telegraph, the Panama Canal and the telephone are taking western thought to the East and bringing Eastern peoples to the West.

This year practically marks the beginning of this mighty interchange. During the next few months we of the West will be the hosts to thousands of visitors from the East. At San Francisco alone more than seven hundred conventions will be held in connection with the celebration of breaking down the barrier across the Isthmus of Panama by means of the Panama Canal. Many of these are national and even international in scope so that abundant opportunity will be afforded for teaching the visitors in what respects the West has been different and in learning how it will soon become like the rest of the world.

Public utility men, particularly, will be brought into close contact by means of such conventions as the National Electric Light Association in June, the National Electrical Contractors' Association in July, the American Association for the Advancement of Science in August, the International Engineering Congress, the Panama-Pacific meeting of the American Institute of Electrical Engineers and the Gas Congress in September and the American Electric Railway Association in October. These conventions will be of material assistance in breaking down the human barriers, just as the engineering and scientific efforts of their members have been instrumental in breaking down the physical barriers which have tended to isolate the West.

Within a few short years the West will cease "to be different." Immigration to its vast agricultural possibilities and to its growing seaports will tend to materially change the character of its population. In order that this new blood be properly transfused into the body politic, it behooves the people of the West to learn from their visitors what has been accomplished in the East. Thus while welcoming the stranger to our gates and teaching him about our heritage we should learn what he has to impart.

PERSONALS

E. A. Hunt, electrical dealer of Pleasanton, spent a few days during the week at San Francisco.

W. B. Smith of the J. C. Holbrecht Co., Sacramento, was a visitor at San Francisco during the week.

Henry C. Doer of the Garden City Electric Co., San Jose, was a visitor at San Francisco during the week.

J. Zankovich, electrical contractor of Watsonville, Cal., was a visitor at San Francisco during the week.

Thos. Mirk, president of Hunt, Mirk & Co., San Francisco, is on a business trip to Los Angeles and San Diego.

Arthur Peck of the Electric Supply Co., Sacramento, was among the visitors to San Francisco during the week.

Albert Casper of the Vallejo Light and Power Co., Vallejo, Cal., spent a few days during the week at San Francisco.

W. B. Hall, representative of Pass & Seymour Co., San Francisco, is at present on a business trip to Los Angeles.

G. A. Sherman of the Western Electric Co., San Francisco, is making a business trip through the southern part of California.

George Batty, formerly with the Electric Agencies Co., has become associated with the Keeler White Co., San Francisco.

S. M. Spiller, resident engineer of the Western Electric Co. at Peking, China, was in San Francisco during the week, en route East.

N. W. Brockett, attorney with the Puget Sound Traction, Light and Power Co., has returned to Seattle after an extended visit to California.

F. H. Leggett, Pacific Coast manager of the Western Electric Co., has returned to San Francisco from a business trip through the Northwest.

D. H. Cogswell, formerly master mechanic of the Thrall Con. Co., has accepted a position with the Natomas Consolidated Co. as chief electrician.

F. E. Johnston, vice-president of the M. W. Kellogg Co., New York, at present at Los Angeles, is expected to arrive at San Francisco in the near future.

Edmund E. Walker of the British Columbia Electric Ry., Vancouver, B. C., was a recent visitor at San Francisco while returning home from a business trip to London, Eng.

J. I. Colwell, manager of the Seattle branch of the Western Electric Company, has returned from Chicago, where he attended a convention of the company's branch managers.

A. S. Moody, assistant local manager of the General Electric Company's Portland branch office, who has been in Seattle for several days on business, has returned to Portland.

A. Seiler, claims agent of the Sierra and San Francisco Power Co., San Francisco, who has been confined to the hospital for some weeks past, is now sufficiently recovered to be out again.

C. R. Wallis, who has been spending the last two weeks in the territory covered by the Seattle office of the General Electric Company, has returned to Portland, where he makes his headquarters.

S. H. Lanyon of Pierson, Roeding & Co., who has been for some time on a business trip through the East, arrived at San Francisco during the week and will make this city his future headquarters.

Ira J. Wolfe, Pacific Coast representative of the Pittsburgh Electric Specialties Company, with headquarters at San Francisco, is making a tour of the state, spending a week in Southern California.

H. B. Squires of the H. B. Squires Co., San Francisco, who has just returned from the East, is to represent on the Coast the Geo. Cutter Co. of South Bend, Ind., and the Oshkosh Mfg. Co. of Oshkosh, Ind.

Prof. Elihu Thompson of the Thompson House Co., Lynn, Mass., is a visitor at San Francisco during the week. On Thursday evening he was the guest of honor at a dinner given by Dr. Thomas A. Addison.

J. H. Livsey, secretary-treasurer and general manager of the General Electric Co., of Michigan, and wife is spending some time at San Francisco, visiting the Exposition and getting in touch with the electrical field in the West.

W. D'A. Ryan, illuminating engineer for the General Electric Company, and chief of illumination at the Panama-Pacific International Exposition, was especially honored on the night of April 13th, which had been set aside as "Illumination Night." In addition to being the guest of honor of the Exposition authorities, he was presented with a commemorative bronze plaque. Special lighting features were brought forth in addition to the wonderful effects obtained nightly.

C. E. Boggs, superintendent Klees Electric Company, Summerville, Ore.; **R. S. Brown**, assistant electrical engineer Northern California Power Company, Redding, Cal.; **J. W. Crowe**, superintendent Eagle River Electric Power Company, Baker, Ore.; **M. Curtis**, draftsman, electrification department C. M. & St. Paul Ry., Butte, Mont.; **E. J. Balloon**, irrigation specialist, new business department Utah Power & Light Company, Salt Lake City, Utah; **T. W. Fitzgerald**, instructor in electrical engineering, University of Arizona, Tucson, Ariz.; **N. G. Hardy**, master mechanic Arizona Copper Co., Clifton, Ariz.; **C. K. Hatcher**, chief operator Puget Sound Traction, Light & Power Co., Snoqualmie Falls, Wash.; **W. C. McKay**, draftsman Anaconda Copper Mining Co., Anaconda, Mont.; **R. A. Ransdall**, superintendent of transmission lines, Sierra & San Francisco Power Co., San Francisco, Cal.; **J. H. Slater**, electrician Paraffine Paint Co., Emeryville, Cal.; **E. E. Stevenson**, draftsman, mechanical engineer's office, Los Angeles Hall of Records, Los Angeles, Cal.; **L. C. Williams**, assistant to engineer in charge of substations, Pacific Gas & Electric Co., San Francisco, Cal.; **B. A. Williamson**, electrolysis inspector Los Angeles Gas & Electric Corp., Los Angeles, Cal., and **J. E. Yates**, Pacific Power & Light Company, Portland, Ore., have been elected associate members of the American Institute of Electrical Engineers.

MEETING NOTICES.

Sacramento Jovian League.

The Sacramento Jovians have entered a ball team in the Sacramento Amateur Elimination League, and started off by winning from the strong Woodland club by a score of 11 to 8. It was a great game of ball and the Sacramento Jovians are confident that their team will be league leaders. A big delegation made the trip to Woodland to help root their team to victory. As to results, C. V. Schneider is conversing mostly in a whisper.

Electrical Development and Jovian League of San Francisco.

In the absence of President F. H. Leggett, Mr. C. F. Butte presided at the League meeting on April 7. An invitation was received from the Alameda County Electrical Development League for the San Francisco league to attend their monthly meeting on April 24. Mr. R. M. Alvord of the General Electric Co. was then introduced as chairman of the day. Several members of his organization provided a novel entertainment illustrative of a heated argument in a Chinese restaurant, and an excellent innovation was successfully tried out by requiring each member to introduce his right-hand neighbor. The main feature of the meeting was a moving picture film of the Panama Canal, which was greatly enjoyed by those present.

Jovian Electrical League of Southern California.

Over 100 Jovians and their friends attended the luncheon of the League, held at Christopher's, Los Angeles, on April 7th, which was ably presided over by F. B. Nightingale, the chairman of the day. Tribune Pieper, following the customary introduction of guests, put in some of his "fine" work when he discovered some unsuspecting co-operator without his identification badge or disporting himself unworthily, but was himself severely rebuked by the members to the extent of 50 cents for carrying his perfectly handsome, light yellow gloves in his trouser pockets, instead of the location officially designated by society. The worthy Tribune called the attention of the members to the efficiency course instituted by the Jovian Order, also the $200 prize contest announced in the April "Jovian," and the advisability for every good Jovian to postpone his trip to San Francisco until June 10th, which will be celebrated as Jovian Day at Jewel City. Vocal selections were rendered by Otto Fischer, accompanied by Dick Alter. Then followed an instructive talk by Samuel Storrow, president of the Engineers' and Architects' Association of Southern California, on "Traffic Congestion and Subways." He laid particular stress on the fact that early morning and evening traffic is practically of a through or express nature, and that therefore local street car service cannot adequately take care of it. He urged the necessity of keeping automobiles from standing any longer in front of stores in the business district than is essential for the discharge and taking on of passengers. By actual count, in Los Angeles, it was found that in one day recently 5000 autos were in motion on Broadway, but that there were only 150 spaces along the curb where they might have found refuge for the discharge of their loads, which, by the way, averaged only 1½ passengers per car. It's this use of the busy streets as garages which is responsible for a great deal of the congestion. It is also essential that cars and autos should be moved in the same direction at the same time at street corners. Mr. Storrow illustrated his points by means of many slides, showing street conditions in various large cities, as well as types of subway construction.

The Portland Jovian League.

The regular luncheon was held at the Benson Hotel, at noon, April 9, 1915. Mr. J. E. Werlein was chairman of the day. Mr. F. W. Hild, general manager Portland Railway, Light & Power Company, was the speaker of the day, and his subject was "Needs of the Electrical and Allied Industries in Portland and the Northwest." Lucille Maxon and Bud Jaeger, two eight year old Jovians, entertained the meeting in the "Maxixe" and "Costume Dances"; Miss Blanche De Lury sang a solo also. As the budget for the coming Rose Festival does not contain an appropriation for an electrical parade it was resolved, that the president of the League be directed to appoint a committee of three members to wait upon the Rose Festival committee at its meeting April 20th, to urge upon the Rose Festival committee the importance of an electrical parade and offering the Rose Festival committee the co-operation and advice of the Portland Jovian League in this connection; and that the Oregon Civic League, Realty Board, Rotary Club, Ad Club, Progressive Business Men's Club, Transportation Club and East Side Business Men's Club be requested to name a representative to join with the committee of the Portland Jovian League at dinner at the Commercial Club at 6 o'clock Tuesday night, April 20th, and organize as a general committee on Rose Festival electrical parade and that the said committee wait on the Rose Festival committee at their meeting at 7:30 the same evening and present to them the importance of providing for an electrical parade at the 1915 Rose Festival. These resolutions were amended so that C. E. Warner was made chairman of this committee, with W. H. P. Hill, A. C. McMicken and S. C. Jaeger.

Mr. Weinstock of the National Theater offered same to be used for a benefit to start a fund for the electrical parade.

To stimulate membership there had been arranged a contest between W. H. P. Hill of the Northwestern Electric Company and J. C. Henkle of the Portland Railway, Light & Power Company. The contest consisted of getting the largest attendance at the luncheon. The prize being an electric perculator. The results stood as follows: Mr. Henkle 111. Mr. Hill 74, neutral 4. Total 189 members in contest. also 15 members did not vote. Grand total 204 in attendance.

M. E. Cheney, first tribune of the Seattle Jovian League, was a guest and said, "this was the best meeting he had attended in any city." Also J. E. Werlein said "that this League was now the most enthusiastic organization in Portland."

CONVENTION OF NATIONAL ELECTRICAL CONTRACTORS' ASSOCIATION.

The 1915 convention of the National Electrical Contractors' Association will be held at San Francisco, July 20-24, 1915.

Arrangements have been made for a special train from Eastern cities. This official train is scheduled to reach Los Angeles at 2:40 p. m. July 15th, where the electrical men of the city, headed by John C. Rendler, will entertain the delegates until they leave for San Diego at 11:59 p. m. Friday, the 16th, will be spent at the Panama Exposition and Coronado and Saturday, the 17th, at Los Angeles again. Upon arriving at San Francisco on Sunday morning, July 18th, the train will be met by the reception committee of the California State Association, and escorted to hotels. The new Clift House at Geary and Taylor streets has been selected as headquarters.

The convention will open Monday, July 20th, in the new civic auditorium, and continue in session until July 24th, during which time and thereafter opportunity will be given to visit the Exposition and the surroundings of San Francisco.

Return tours have been planned by way of Portland, Seattle, Yellowstone Park and the Canadian Rockies.

NEWS OF CALIFORNIA RAILROAD COMMISSION.

The commission has issued an order authorizing G. Warren to transfer the Cambria Telephone Company of San Luis Obispo county, to A. F. Paterson. A. F. Paterson is, in turn, authorized to sell the system to Mrs. J. Guerra.

The Home Telephone & Telegraph Company of Santa Barbara has filed an application with the commission requesting authority to renew a promissory note in the sum of $10,000, held by the Commercial Bank of Santa Barbara, and a note held by the Santa Barbara Savings and Loan Bank in the sum of $15,000.

The Foothill Ditch Company of Tulare county has filed an application with the commission requesting authority to issue $15,000 of promissory notes and 10,000 shares of stock of the par value of $1 per share.

The Pacific Gas & Electric Company has filed an application with the commission requesting authority to sell a transmission line supplying electric energy to Reclamation District No. 900 in Yolo county, to the West Sacramento Electric for the sum of $11,740.87.

PUBLICATIONS RECEIVED.

"Standards for Gas Service"; third edition. Circular No. 32, U. S. Bureau of Standards, Washington, D. C., 197 pp., discussion of technical specifications, enforcement of technical regulations, rules proposed for state and city regulating commissions, summary of laws in force, manufacture and distribution of gas.

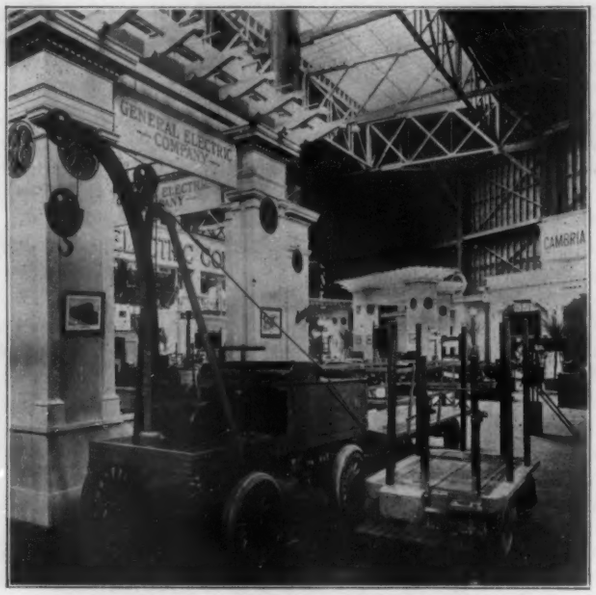
INDUSTRIAL

THE ELECTRIC SOLUTION OF THE INTERNAL TRANSPORTATION PROBLEM.

BY R. E. PLIMPTON, E. E.

The internal transportation of goods naturally divides itself into two classes. In the first, common carriers, such as railroad and steamship lines, express and terminal companies, load and discharge boats, cars and other shipping mediums, and distribute the goods in sheds and storehouses. The second class consists of industrial plants in which supplies, raw materials, goods in process and finished materials must be transported to the various buildings.

To the common carriers the most troublesome internal transportation problem is the delivery and receipt of L. C. L. or package freight. The present congestion in freight and marine terminals is notorious. The delay in the movement of freight caused by the lack of a proper system and by



Battery Truck Crane Used in Construction of Panama-Pacific International Exposition.

inadequate handling facilities is long, serious and expensive for consignees, consignors and carriers.

The methods proposed to remedy the trouble involve the substitution for the present manual labor of mechanical appliances, such as telpherage systems, elevators, cranes, conveyors and finally the use of a special form of storage battery vehicle known as the industrial truck. In many cases it is impossible to use cranes or overhead telpherage systems because the buildings are not designed to carry such a load. The construction of the cars and boats also prevents the use of many forms of handling devices.

The industrial truck has been created for application to existing conditions. The freight truck, a particular form of industrial truck, is designed for use on ordinary floors and in narrow passage ways with short turns to supersede the common two-wheel hand truck, using the same class of labor. It will travel through freight car doors or into steamship holds, climb the ordinary gang plank and, although intended for internal use, will even cross streets between buildings of the plant.

Modern industrial plants are constantly seeking to decrease their manufacturing costs. Each plant has a large number of men continuously employed in moving goods in and about the buildings. The use of freight trucks is of importance as regards both reduction in the transportation costs and the most efficient operation of machinery and workmen engaged in production. The latter is of paramount importance, especially when it is realized that on the proper transportation depends the possibility of doing any production work.

The transportation methods of factories, mills and other industrial establishments have hitherto consisted of industrial railways, traveling cranes, conveyors and the manually operated two or four-wheel trucks.

The cranes are useful for heavy work which is moved trolley wire for supplying power. Their radius of action is limited, while the industrial truck is flexible, will travel anywhere on ordinary floors, walks or passages and requires an

General Vehicles 2000 lb. Industrial Truck.

initial outlay only for the vehicle. The truck can also be used in the same way as is the industrial locomotive with the additional advantage that ordinary four-wheel trucks can be drawn to and left or picked up at any part of the works.

Considering the trucks from the viewpoint of construction, there are three principal forms which have been developed for particular conditions and are widely used—the freight truck, the tractor and the battery crane truck.

A wide variety of such vehicles have been developed by the General Vehicle Company of Long Island City, N. Y. They have all the well known advantages of the larger electric truck in being clean, odorless and practically silent in operation. Their construction simplifies operation and maintenance. Freedom from fire or explosion commends them to fire commissioners and underwriters. The men who previously have been using hand trucks are quickly taught to drive them.

One 2000 lb. freight truck does the work of five men with their hand trucks and in one-third the time. And in spite of the increased initial and maintenance cost of the electric truck, a saving of from $5 to $10 a day is obtained under average operating conditions. With such a saving the truck pays for itself in a few months.

The charging of these vehicles furnishes a most inviting field for the use of central station energy. Since the average daily charge is about 6 kw.-hr., 50,000 vehicles would add nearly 100,000,000 kw.-hr. of off-peak business to the yearly central station load.

NEWS NOTES

ILLUMINATION.

SUSANVILLE, CAL.—The board of trustees has granted to H. Howard Dunbar a gas franchise in this city.

SAN JOSE, CAL.—The city clerk has been instructed to have new electroliers on North Fifth street connected up.

EUGENE, ORE.—A petition has been presented to the City Council for the installation of ornamental lights on Willamette street.

PASADENA, CAL.—The city commission has adopted resolutions for the installation of an ornamental lighting system on North Fair Oaks avenue.

ALBION, WASH.—Engineers surveyed a right of way and made estimates on the water power from the dam above town for municipal electric lights.

LORDSBURG, N. M.—The Lordsburg Water, Ice & Electric Company has been sold to W. F. Ritter. The plant will be remodeled and put into service at an early date.

LOS ANGELES, CAL.—A request to be allowed to proceed with plans for the city doing all its own street lighting has been filed with the water board by Electrical Engineer Scattergood.

SAN BERNARDINO, CAL.—A meeting will be held soon to determine the style of electroliers to be installed in the business district of this city. Various designs are under consideration.

DEER LODGE, MONT.—A contract has been let to the Carey Engineering Company of Helena, Mont., for the installation of sixty-two ornamental electric light posts. The contract price was $1,643.

PASADENA, CAL.—The city commission has awarded the contract for ornamental lights along South Lake avenue and certain other streets to the F. E. Newberry Electric Company at $6064, complete.

SEATTLE, WASH.—Bids will be received until April 21st by the Port of Seattle commission for the installation of light and power system for the fruit storage building in E. Water way terminal improvement.

WASCO, CAL.—This town is to have natural gas for lighting and other purposes, according to C. H. Ball of the Farmers' Gas Company. The trunk line will be tapped in the Rio Bravo district and run north to Wasco

LOS ANGELES, CAL.—The city council has passed an ordinance ordering the necessary electric current to be furnished for the lighting of Canal street from East and West First street to East and West Third street.

POMONA, CAL.—The board of trustees have awarded a contract for the installation of ornamental lighting posts on portions of Second, Third, Park avenue, Gordon and certain other streets, to Keystone Iron Works, Inc., at a cost of $15,938.80.

SAN JOSE, CAL.—The board of supervisors received a petition from Henry Abel and others asking for the formation of a highway lighting district to be known as the Milpitas Highway Lighting District, and adopted a resolution ordering an election to be held in the proposed district on May 3d.

MARTINEZ, CAL.—The Pacific Gas & Electric Company has purchased a piece of property here whereon will be erected a modern office building. The block will be built on Ferry street near the Southern Pacific Depot, and will be the office of the Contra Costa district, over which Don C. Ray is manager.

BAKER CITY, ORE.—City Clerk Cunning has approved the form of petition submitted by Robert Service to initiate a popular election July 14th, at which an appraisement ordinance for the extension of the Baker municipal power plant will be voted on as a preparatory step to voting on a bond issue for a city plant.

TRANSMISSION.

HUGHSON, CAL.—The Yosemite Power Company has under consideration the construction of a line south from Hughson along the Tulley Boulevard.

ASTORIA, ORE.—Two large boilers at the power plant of the Hammond mill blew up a few days ago wrecking the engine room. This plant supplies the Pacific Light & Power Company, and as a result the city was left completely without light or power.

SEATTLE, WASH.—A break has occurred in two power pipe lines between the old timber dam and the new masonry dam at the Cedar River power plant of the city. The pipes are of wood stave construction and Superintendent Ross has before requested authority from the council to put in a steel penstock.

FLORENCE, ARIZ.—The town council is considering a proposition for the extension of the Roosevelt power line from Sacaton to Florence. The cost per mile for the extension would be about $700 for material and the cost of a distributing system throughout the city would amount to about $2500 more, or a total expenditure of about $80,000.

PLACERVILLE, CAL.—The Western States Gas & Electric Company, of which H. R. Bennett is resident manager, is arranging to make extensive improvements to its plant on the South Fork of the American River. Bulkheads at the dam will be renewed, also much of the flume and the power house will be enlarged to accommodate additional machinery. The work contemplated would cost about $80,000.

MARTINEZ, CAL.—The building of a power line into the works of the Shell Company for temporary service gives rise to the rumor that the Great Western Power Company has been awarded the contract for furnishing electricity for power and lighting purposes in the building of the big Martinez refinery. The contract was awarded after competitive bidding. It is rumored among the electrical men that the Shell plans its own electric service proposing to build a station in which will be installed a Diesel turbine and dynamo for supplying the whole plant which will operate principally by electricity.

TRANSPORTATION.

SAN FRANCISCO, CAL.—Final arrangements have been made by the supervisors for building the loop at the beach terminus of the Geary street road, $2300 being appropriated for the work.

FAIRFIELD, CAL.—The Sacramento Valley Electric Railway and the Oakland, Antioch & Eastern are made defendants in a suit instituted to foreclose a mechanic's lien claimed by Contractors Palmer & McBride. The contractors' claim is for trestle work, lumber, piling, ballasting and track and trolley construction work on the Sacramento Valley Electric. The total construction price was $30,224, of which it is alleged $27,699 is still due.

OAKLAND, CAL.—Several changes in the directorate of the Oakland, Antioch & Eastern Railway were effected at the annual meeting of the stockholders. The new board consists of Walter Arnstein, S. L. Naphtaly, H. C. Breedon, C. Osgood Hooker, Fred Beaver, Jesse W. Lilienthal, Fred H.

Beaver, John I. Walter, A. Haas and H. A. Lardner. The directorate will be increased to eleven by the addition of Henry T. Scott, president of the Pacific States Telephone Company, and H. A. Mitchell, who is general manager of the system. The directors elected Walter Arnstein as president; S. L. Naphtaly and H. C. Breedon as vice-prresidents, and H. A. Mitchell as secretary-treasurer. The annual report of President Arnstein, covering the first complete calendar year of operation, which ended on December 31st last, showed a total of 124 miles. The total number of passengers carried during 1914 was 586,000. Gross revenue was $542,180, operating expenses were $394,689 and gross operating income was $147,623.

TELEPHONE AND TELEGRAPH.

RIVERSIDE, CAL.—The council has granted the Pacific Telephone Company a franchise for 20 years.

DILLON, MONT.—The Mountain States Telephone Company will start work at once on extension of the lines and cables of the company.

SUMNER, ORE.—The East Side Telephone Company of Sumner has been organized with A. J. Charleston as president, and M. Roberts as secretary.

DEARY, IDAHO.—An ordinance has been passed granting to F. C. Miller a franchise to construct and operate a telephone line in the streets of this city.

KLAMATH FALLS, IDAHO.—Farmers will take up plans for immediately starting operations on a telephone line to be known as Reclamation Rural Telephone.

SUMNER, WASH.—Poles have been ordered by the East Side Telephone Company of this city. Orders for other material will be placed at once. A. J. Charleston is president.

COLVILLE, WASH.—The Arden Telephone Company has extended its branch line from Arden up Little Pend Oreille River for 10 miles to Narcisse valley and will extend line to Middleport on the lakes.

OLYMPIA, WASH.—Frank R. Spinning, of the Washington Public Service Commission, has announced that the telephone lines will be extended south from Dwamish to reach Tukwila, Riverton and Foster.

SAN FRANCISCO, CAL.—The Pacific Telephone & Telegraph Company, has let the contract for a three story and basement steel, brick and concrete building on North London and Russia avenues for $37,495.

SOUTH BELLINGHAM, WASH.—When Harris avenue and Eleventh street are permanently improved this spring, the Pacific Telphone and Telegraph Company will place its wires on those streets underground.

WITHROW WASH.—G. W. Turner and J. W. Debar, who have been soliciting stock subscriptions to build a telephone line between Willow Springs and Withrow, have met with sufficient success to insure the line.

SANTA BARBARA, CAL.—The Pacific Telephone & Telegraph Company has authorized the expenditure of $50,000 this summer for its telephone equipment at the central exchange and in the Oak Park and Mission districts.

EVERETT, WASH.—As the city contemplates the improvement of Everett avenue, City Engineer Hoover has entered into negotiations with the telephone companies to confine themselves to three poles to each block.

JUDITH GAP, MONT.—The Ross Fork Telephone Company has been organized with Harvey McLaughlin, president; James T. Row, vice-president; C. R. Buller, secretary; Chas. Roberts, manager. Work is to start at once on construction.

SAN FRANCISCO, CAL.—The Mare Island Navy Yard has received a large supply of material with which to construct generators. The island yard is scheduled to build 24 generators during the coming summer to operate radio outfits on the boats of the Pacific fleet and at the navy radio stations.

LATON, CAL.—A standard telephone system, to start at Laton and run to F. T. Bailey's ranch, thence easterly along the road to the Kings county line, and over certain other roads, has been ordered built by the Fresno-Kings Reclamation District.

HAILEY, IDAHO.—Informal bids are being received at the local forest service office for the cutting and peeling of 450 telephone poles to be used in the construction of twenty miles of telephone line from Pierson to Redfish and Alturas lakes.

EVERETT, WASH.—The Pacific Telephone & Telegraph Company contemplates certain improvements, the plans for which include the reconstruction of a pole line between Marysville and Arlington, at a cost of about $5560. And the replacement of the line between Arlington Junction and Arlington, at a cost of $3950.

WEED, CAL.—The Pacific Telephone & Telegraph Company has taken over the Weed telephone system, formerly owned and operated by the Weed Lumber Company. E. G. Weed has been appointed agent. The exchange will be moved on May 1st from the Weed postoffice to E. G. Weed's jewelry store, where a fully modern plant will be installed.

PORTLAND, ORE.—Fred Spoeri, manager of Pacific Telephone & Telegraph Company has announced that authority had been given to spend $13,900 in rebuilding 5½ miles of toll lead between Portland and Hood River on the route of the new Columbia highway. Also authority has been given to spend $6120 for replacing underground cable.

WATERWORKS.

ANACORTES, WASH.—The people voted against the water works bonds at the election last week.

SUSANVILLE, CAL.—A petition has been filed asking the board to call a special election for voting bonds to provide a water works system.

PRINEVILLE, ORE.—Culver City and Opal City are to have a water system. They plan to lay pipes and pump water from Opal Springs to the various homes in the country.

MARSHFIELD, ORE.—Estimates of a water system for Cooston and Eastside have been ordered by the city council of Eastside and S. B. Cathcart, city engineer, has started on the work.

KELLOGG, IDAHO.—A proposal that the city install its own water system was brought up before the council and a committee has been appointed to investigate the feasibility of bringing water from Big Creek. The cost is roughly estimated at $125,000.

OGDEN, UTAH.—Approval of the city commission's plan to issue $75,000 worth of bonds this spring was given at a recent election. Work of drilling additional wells will now be started immediately, and the contract for pipe line extensions will be let on April 19th.

SAN FRANCISCO, CAL.—At a recent meeting of the board of supervisors, a resolution was adopted providing $181,944 out of the water construction fund bond issue of 1910, for preliminary work on the Hetch-Hetchy project. This work includes the building of a diversion tunnel costing $40,000, clearing the reservoir, installing a sawmill at a cost of $12,000, surveys, test borings and similar work.

SACRAMENTO, CAL.—Thirty Pacific Coast and Eastern pipe and construction companies have applied to City Engineer Frank M. Miller for the plans and specifications for the $800,000 job of supplying and laying Sacramento's new water system. The local firms applying for plans are the Union Iron Works, Crane Co., Clark & Henry Construction Company, Schaw-Batcher Company and Mathews Construction Company. The Universal Pipe Company, which is represented in Sacramento by the Miller-Enwright Company has installed an exhibit of sheet steel and cast iron pipe at the corporation yards.